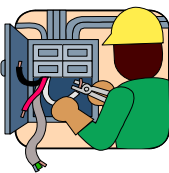




**August 2005
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Training Gram**

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INL ELECTRICAL CRAFTS TRAINING PROGRAMS

For the purposes of this newsletter, INL is used to describe the Idaho National Laboratory, which is the name of the geographical location of the DOE (Department of Energy) site. The information contained in this newsletter is intended for both the INL (Idaho National Lab Contractor, BEA (Battelle Energy Alliance)) and the ICP (Idaho Completion Project Contractor).

INL ELECTRICAL ADVISOR

Electrical Safety Committee

As part of the Annual Review of Electrical Safety Performance, the following issues were identified that led to electrical occurrences:



1. Failure to determine the proper isolation point for Lockout and Tagout. (recurring issue). **Contributing factors include walkdowns, communications, and lack of accurate drawings.**
2. Discovery of live electrical after zero energy verification. **Contributing factors include walkdowns, communications, and lack of accurate drawings.**
3. Failure to restore systems to a safe condition prior to release of Lockout and Tagout or Clearance. **Contributing factors include walkdowns, communications.**
4. Failure to install system properly creating an unsafe condition. **Contributing factors included modification to listed equipment and communications.**
5. Unintended intrusion into underground electrical system. **Contributing factors included ineffective communications – results of Subsurface Investigation Team (SIT) were not included in the work package.**
6. Unintended intrusion into overhead line. Signaler/spotter controls and communications were deemed inadequate. **Ineffective communications.** Actions were subsequently taken to revise MCP-2745.

Our part in improving on these items is to be familiar with what they are, and then increase our focus on doing our part in keeping these types of occurrences from happening. As we perform our activities within our work scope, along with all the other factors we have to deal with each day, we should do our best to make sure we don't perform work activities that lead to any of the six items identified as the major causes

of electrical occurrences. Reducing the number of these occurrences is well within our ability to do so.



Power Management

TRA transformer 8T3-2 was changed out July 15th and 16th. Mullen Crane came in with a crew of three and the transformers were swapped. The old and new transformers weighed about the same at 50 tons each. Waukesha Electric Systems (WES) field service also came in on the 15th and with Power Management's help assembled the new 8T3-2. On the 16th, WES successfully tested the transformer. Warren Rees - Power Management

Old one on its way out. Worker with tag-line not under transformer



New transformer almost on the Pad



This is the last transformer change out at RTC. All were high risk jobs done safely. Excellent work and congratulations to all involved!



Do you know the Answer?

- 1. Where the premises wiring system contains feeders supplied from more than one voltage system, each ungrounded (hot) conductor, where accessible, must be identified by the system. Identification can be by _____ or other approved means. Such identification must be permanently posted at each feeder panelboard or similar feeder distribution equipment. (marking tape; tagging; any of these; color-coding)
- 2. At least one receptacle outlet accessible from grade level and not more than _____ above grade must be installed at each dwelling unit of a multifamily dwelling located at grade level. (24in., 3 ft., 6-1/2 ft, 8 ft.)
- 3. Grounding electrode taps from a separately derived system to a common grounding electrode conductor are permitted when a building or structure has multiple separately derived systems. (True/False)

(See Answer under “Answers To”)



Training

ISMS – CCR and Electrical Workers

The number three item listed in the company’s eight guiding principles of ISMS is “Competence Commensurate with Responsibilities” (CCR). Electrical work is



certainly at or near the top of the list for occupations with the most real and accessible hazards. However, it is not at the top of the list for workers injured in the work place. There is a reason for this. Our electrical workers are well qualified and trained to perform their work safely. Electrical energy is very unforgiving if an error is made, and none of us can respond physically at the same rate electrical energy can release its potential for personal harm and destruction (We can’t

respond at the speed of light, though some uninformed individuals think they can.)

Our electrical workers are tested and hired with the understanding they have the basic knowledge and skills to perform their work. Additional training is given as required to help maintain knowledge and skill levels and to teach new skills to establish CCR for identified job functions. Electrical safety training is an ongoing process with an established refresh cycle to update to new/changed requirements and to maintain and improve knowledge and skill levels for electrical safety. The company provides update training for each new National Electrical Code revision. All of these items help maintain our electrical worker’s competence at a level commensurate with the things they are tasked to do. An electrical worker can verify their CCR training status and requirements by selecting “Training” on the company home page, then selecting “My Personal Reports” in the “Reports” section. Several options are then available. These include “Training History” that lists all the courses an employee has taken, and “Training Plan” that lists all the required qualifications and courses an employee has for their job description and their status.

At a personal level, it is vital that each electrical worker take seriously the opportunities to refresh and update their knowledge in all the areas required for their job functions. It is also important they use this knowledge to help other workers to understand the importance of performing electrical work safely and accurately, and to be a willing participant in correcting unsafe acts and conditions. It is also important not to rely solely on the company to keep your knowledge and skills at a competent level. Opportunities for self-study are always available and should be used. The comment, “I haven’t thought about this in years” should not be in our vocabulary. Being self motivated to study and learn and taking the opportunity to learn all we can from company provided training will help us maintain our *Competence Commensurate with our Responsibilities*.



Safety Meeting

Human Performance common misunderstandings (Myths)

- Myth 1 – If there are no events, there is no human performance problem. Fact – Trivial human errors occur moment by moment in an operating facility. The absence of events is more a function of the presence and integrity of defenses, barriers, controls, and safeguards than the errors people make.
- Myth 2 – Training will solve the human performance problem. Fact – Frequently, training is not the solution to performance problems. Just because people may know what the right thing to do is does not mean they will do it.
- Myth 3 – Self-checking means good human performance. Fact – Self-checking is an attention-management tool to aid an individual in verifying performance at critical points in an activity. Not all activities are skill based. Other types of activities will require rule and knowledge based responses to prevent, catch, and recover from the consequences of error.
- Myth 4 – Accountability is all that is necessary. Fact – Many people unconsciously believe that “bad people make bad errors.” Human performance Principle No. 1 states that, “people are fallible, and even the best people make mistakes.”
- Myth 5 – Significance determines culpability. Fact – Administering disciplinary action based entirely on the severity of the event is faulty logic. The severity of an event is a function of the weaknesses in defenses, not the error of the individual. Weaknesses in defenses are more a function of the organization and management domains than one person’s mistake.
- Myth 6 – Reward and reinforcement are the same. Fact – Rewards are given based on the results obtained. Behavior is how the results were obtained. Behavior is reinforced if explicitly tied to a positive consequence for the person. Rewards occur relatively infrequently. Reinforcement occurs whenever the behavior occurs. At any given moment,

management is getting precisely the performance the organization is tuned to produce.

Myth 7 – Experience means error-free performance. Fact – Experienced personal are not infallible. They do not perform error free as much as they are error aware. Because of their experience, they are more likely to identify error likely situations and their consequences.

Myth 8 – Errors cause significant events. Fact – Significance is a function of severity, and severity is a function of the robustness of defenses. Several defenses generally must fail in addition to the error to suffer a significant event.

Myth 9 – Errors are bad. Fact – Error is a normal component of human behavior. Error is an opportunity to learn. People are essentially confusing the behavior (error) with the result (event). Most errors are trivial. The so-called “grievous” errors are the ones that, by chance, trigger negative consequences, generally because the person was working in an error-prone, high-risk situation. Adapted from “Human Performance Fundamentals”



Lessons Learned

BEST PRACTICE: USE A VOLTMETER TO VERIFY A DE-ENERGIZED CONDITION

The following events are examples of incidents reported in ORPS regarding problems associated with the use of proximity voltage detectors.



On December 15, 2004, at the Savannah River Site, electricians from the Site Utilities Department discovered unexpected voltage on several conductors in a multi-conductor control circuit cable while performing electrical isolation work. The voltages ranged

from 4 to 69 volts and had been verified as de-energized with a proximity (non-contact) voltage tester. Work was stopped immediately, and the area was placed in a safe condition. There were no injuries. (ORPS Report SR--WSRC-SUD-2004-0009)

On April 24, 2003, at the Savannah River Site, mechanics cut energized 120-volt wires while replacing a fan motor. Investigators determined that the mechanics had used a proximity voltage detector that was not approved for verifying the absence of voltage. Because the detector did not indicate an energized condition, the mechanics cut the wires, resulting in an exhaust failure alarm. (ORPS Report SR--WSRC-LTA-2003-0012)

On September 29, 2001 at the Los Alamos National Laboratory, a sheet metal worker decommissioning a radiological hood cut into a conduit containing an energized 110- volt conductor that supplied duplex outlets. The worker did not receive an electrical shock. Investigators determined that the electrician who removed electrical service to the hood failed to use a voltmeter to verify energized/de-energized status of the outlets as required. Instead, the electrician relied on an inductive pickup-type voltage tester to check the circuit. (ORPS Report ALO-LA-LANLCMR-2001-0029)

On May 23, 2001, at the East Tennessee Technology Park, workers in the K-33 Building produced an electrical arc when they cut a conduit containing an energized 120-volt wire. None of the workers received an electrical shock. Investigators determined that an electrician had attempted to verify that the wiring was not energized by using a proximity voltage detector instead of the voltmeter required by the procedure. Electricians may use proximity detectors to identify the presence of an energized alternating current circuit, but a voltmeter must be used to provide actual confirmation. (ORPS Report ORO--BNFL-K33-2001-0006)

There are many types of proximity voltage detectors available to electricians, mechanics, and electrical workers. When these detectors sense the presence of voltage, they can alert the user with an audible response, vibration, or a glowing lamp. Inductive proximity testers and solenoid-type devices should not be used to test for the absence of alternating current voltage. These testers have a threshold voltage of approximately 60 volts, and below that they cannot reliably detect a 60-hertz electromagnetic field. Even at higher voltages, shielding and insulation can block the electromagnetic field. These testers will not detect a constant direct-current voltage because they are sensitive only to the changing field. Some proximity testers detect the difference in electrostatic potential between the circuit or object being tested and the detector. Therefore, it is important to ensure that the user is grounded and not in contact with whatever is being checked.

Static electricity can also affect the response of the instrument. Metallic conduit can provide a false negative reading because it can bleed the voltage charge from the energized conductors to ground. Although useful on single-phase power, these detectors can be unreliable in three-phase applications that are clustered because the phase voltage flux can cancel the signal to the detector. Non-contact-type voltage testers, which sense voltage based on capacitive coupling, are unable to detect direct current voltage or accurately indicate the magnitude of the voltage. The performance of these instruments can be affected by variations in the test circuit’s capacitive coupling. Proximity-type voltage detectors are useful tools for locating energized cables and devices. However, electrical workers should not rely on them to verify whether electrical equipment is de-energized.

The events listed above illustrate the importance of using voltmeters to verify that electrical equipment is de-energized instead of relying on proximity type testers. Proximity voltage detectors are good instruments for checking whether circuits are energized, but there are limitations to their use. These limitations must be

understood by users, not only for their own safety, but also for the safety of others. The best practice is to always use a voltmeter to verify the absence of electrical energy and to check-test the meter before and after use.

The following ORPS summary is an unusual event, but we need to be sure we do not make this type of mistake. It is essential that when a Personal Lock and Tag is removed that the individual is positively identified.

ALO-KO-SNL-CAFAC-2005-0004

A Maintenance supervisor removed a Lock and Tag from a Building 968 boiler that was thought to belong to an absent Laboratory employee. The supervisor followed the required process for Lockout/Tagout (LO/TO) removal of the absent employee's Lock and Tag. The next day, Laboratory personnel determined that the LO/TO did not belong to that employee, but to a subcontract employee. The first name and last initial of the Laboratory employee and the subcontractor were identical and were factors in this occurrence. In this particular case, there was no imminent danger to personnel, nor adverse effects to equipment or facility operations. Subsequently, Maintenance Management called a safety "time out" to evaluate this issue and provided a LOTO briefing to all maintenance personnel.

XXXXXXXXXXXX

Code Compliance

Memory Jogger

240.83(C) Interrupting Rating. Every circuit breaker having an interrupting rating other than 5000 amperes shall have its interrupting rating shown on the circuit breaker. The interrupting rating shall not be required to be marked on circuit breakers used for supplementary protection.

240.83(D) Used as Switches. Circuit breakers used as switches in 120-volt and 277-volt fluorescent lighting circuits shall be listed and shall be marked SWD or HID. Circuit breakers used as switches in high-intensity discharge lighting circuits shall be listed and shall be marked as HID.

240.85 Application. A circuit breaker with a straight voltage rating, such as 240V or 480V, shall be permitted to be applied in a circuit in which the nominal voltage between any two conductors does not exceed the circuit breaker's voltage rating. A two-pole circuit breaker shall not be used for protecting a 3-phase, corner grounded delta circuit unless the circuit breaker is marked 1 ϕ -3 ϕ to indicate such suitability.

XXXXXXXXXXXX

Answer to:

"Do You Know the Answer?"

1. Answer – "any of these", Refer to 215.12(C) for additional information
2. Answer "6-1/2 ft.", Refer to 210.52(E) for additional information
3. Answer "True", Refer to 250.30(A)(4) for additional information

XXXXXXXXXXXX

Tricks of the Trade

Tape measure retracting too slowly?

Grab you car wax and wax the entire length of the blade to make the gliding in and out easier. Make sure that both sides of the tape are waxed. Preventative cleaning every few months will keep your unit operating trouble free for years.

You only need two tools; WD-40 and duct tape. If it doesn't move and it should, use WD-40. If it moves and shouldn't, then use the duct tape! (Just kidding)

XXXXXXXXXXXX

Just a reminder that you can still get a copy of the "Original" 1897 Code Book

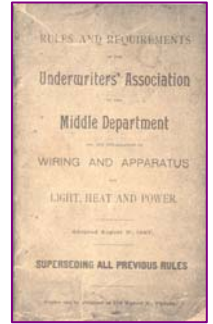
by submitting to the editor one of the following items.

- "Tricks of the Trade".

- Three "Do You Know the Answer", with the answers of course.

- A short article for the "Tech Corner"

- A short article for "Code Compliance" on a code item you feel needs to be covered for our electricians at the INEEL.



XXXXXXXXXXXX

Just for Fun

Q: Do you know how an electrician tells if he's working with AC or DC power?

A: *If it's AC, his teeth chatter when he grabs the conductors. If it's DC, they just clamp together.*

Q: Did you hear about the optimistic electrician?

A: *He took out two twenty (220) year old girls, but found he was only wired for one ten (110).*

Q: What is the definition of a shock absorber?

A: *A careless electrician!*

XXXXXXXXXXXX

If you have a topic you'd like covered, an electrical question answered, or electrical safety item you feel needs to be presented, please forward the item to Mike Bird, mail ID – jbl1@inel.gov, MS 4129 or call 6-2880. An electronic copy of this newsletter is available on the company home page at ESH&QA-Electrical Advisor Newsletter.

Mike Bird, Editor

This publication is intended to be used as a training gram and is designed for individuals involved in electrical work at the INEEL. It is not intended to set or interpret company policy. Sources of information are considered to be reliable. Use of information contained in the articles is at reader's discretion.